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(56) Documents Cited

GB 2202288 A GB 2125126 A GB 1465304 A  
GB 1414915 A GB 1392795 A WO 91/00968 A1

(58) Field of Search

UK CL (Edition M ) F2E EEM EHB EKA  
INT CL<sup>5</sup> F16D 65/00 65/02 65/092 65/84  
ONLINE DATABASES:WPI

(54) A disc brake assembly

(57) In a disc brake assembly the pads 44 of friction material are mounted on back plates 46 which are laminar comprising layers 48, 50 of dissimilar thickness which are joined together by rivets 52. This can reduce brake squeal. In an alternative arrangement a single layer backplate (68, Fig. 6) is used together with a laminar shim to produce the same effect. The layers may alternatively be joined by adhesive, welding, crimping, or by being pressed together.

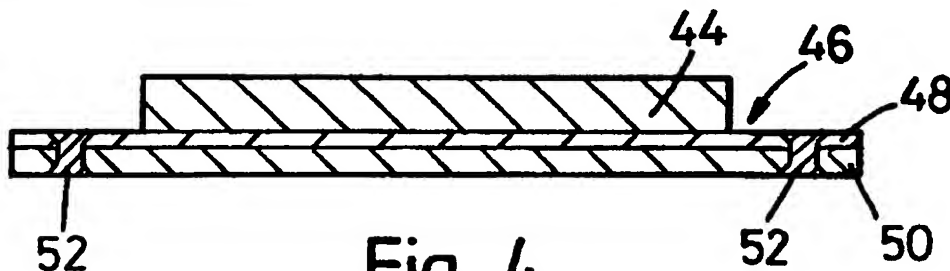


Fig. 4

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1990.

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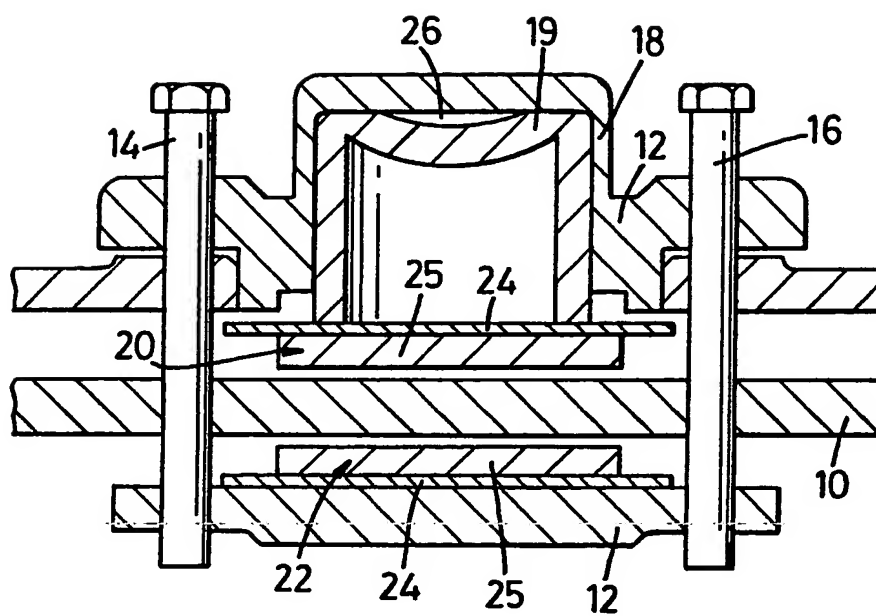


Fig. 1

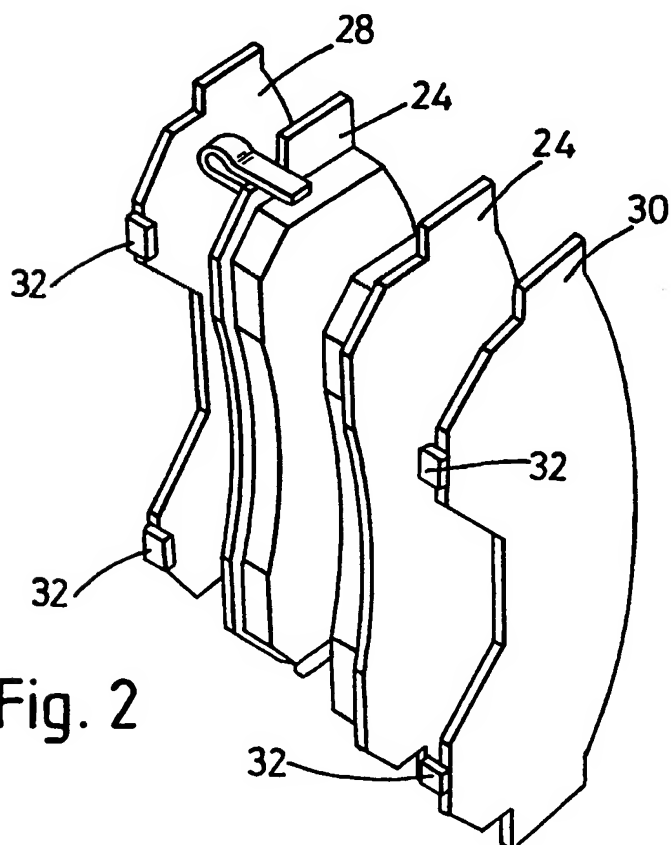


Fig. 2

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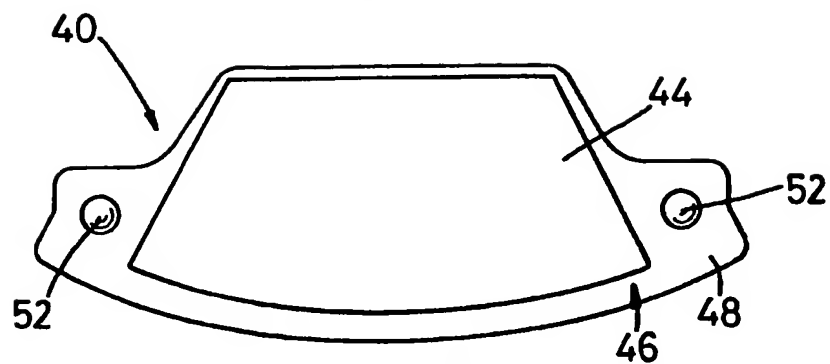


Fig. 3

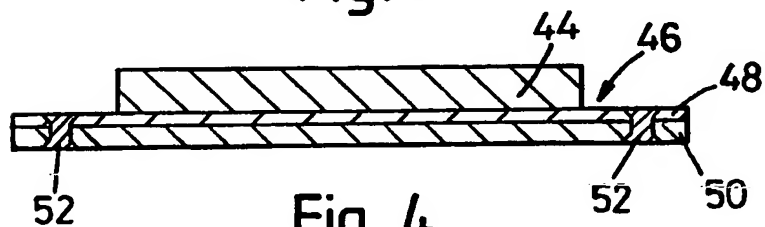


Fig. 4

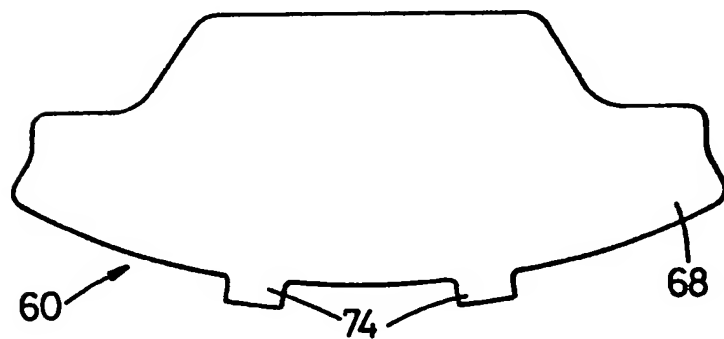


Fig. 5

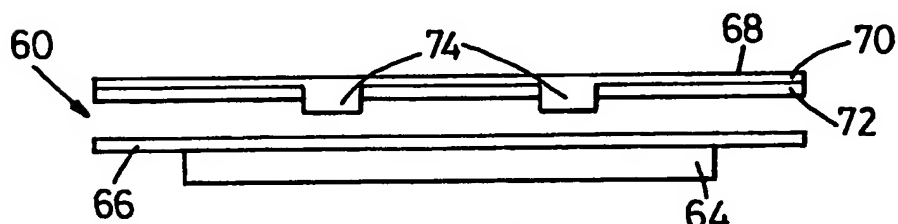


Fig. 6

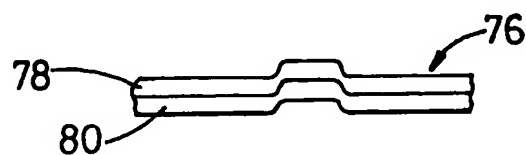


Fig. 7

A Disc Brake Assembly

The present invention relates to disc brakes.

Known disc brake assemblies comprise a disc arranged to rotate with a vehicle wheel, at least one friction pad assembly comprising a friction element and support means  
5 for the friction element, and force applying means for urging the friction pad assembly against the disc to cause braking.

The support means generally comprises a backplate on which the friction element is mounted, and may in addition  
10 include a shim between the backplate and the force applying means, the shim being a separate component which in some circumstances helps to reduce squeal.

However there is still a problem that such assemblies do tend to produce brake squeal under certain circumstances.

15 According to the present invention there is provided a disc brake assembly as described above wherein the support means comprises a laminar member formed from two layers of material of dissimilar thickness. The combining of the two layers to form a single laminar member can help to reduce  
20 brake squeal. The layers of the laminar member can be joined together in a number of ways, such as riveting, spot welding, crimping, using adhesive, or, where the member is press formed, by pressing the two layers together in the same press.

The laminar member may comprise the backplate on which the friction material is mounted, or it may comprise a separate shim.

Preferred embodiments of the present invention will now be  
5 described by way of example only with reference to the accompanying drawings in which:

Figure 1 is section through a known disc brake assembly;

Figure 2 is an exploded view of part of another known disc brake assembly;

10 Figure 3 is a side view of a pad assembly according to a first embodiment of the invention;

Figure 4 is a section through the assembly of Figure 3;

Figure 5 is a side view of a shim forming part of an assembly according to a second embodiment of the  
15 invention;

Figure 6 is an end view of the assembly of Figure 5; and

Figure 7 is an end view of a backplate forming part of an assembly according to a third embodiment of the invention.

Referring Figure 1 a known disc brake assembly comprises a  
20 brake disc 10 mounted for rotation with a vehicle wheel; a calliper 12 slidably mounted on a pair of pins 14, 16 and having an actuating cylinder 18 housing a piston 19; and a pair of friction pad assemblies 20, 22 each comprising a backplate 24 with a friction element 25 mounted on it.

When the brake is actuated by applying fluid pressure to a cavity 26 between the cylinder 18 and the piston 19, the pad assemblies 20, 22 are urged against the brake disc 10 to cause braking.

- 5 Referring to Figure 2, it is also known to include in the assembly of Figure 1 a pair of shims 28, 30 one behind each backplate 24. These comprise simple plates and are located by tags 32.

Referring to Figures 3 and 4, according to a first  
10 embodiment of the invention, in an assembly similar to that shown in Figure 1, a pair of pad assemblies 40 are provided each of which comprises a friction element 44 and support means in the form of a laminar backplate 46. The backplate 46 is formed from a thin layer 48 and a thick  
15 layer 50, the ratio of thicknesses being 40:60. The two layers are joined together by rivets 52.

Referring to Figures 5 and 6, according to a second embodiment of the invention, in an assembly similar to that shown in Figure 1, a pair of pad assemblies 60 are  
20 provided each of which comprises a friction element 64, and support means in the form of a backplate 66 on which the friction element is mounted and a laminar shim 68. The shim 68 comprises a thin layer 70 and a thick layer 72 which are pressed together in the same press tool to form  
25 a single laminar element with locating tags 74. The ratio of the thicknesses of the layers 70, 72 is 45:55.

Referring to Figure 7, a third embodiment of the invention is the same as the first, except that instead of using

rivets, the two layers 78, 80 of the backplate 76 are joined together by being crimped at the periphery of the backplate.

5 The laminar member, whether it is a backplate or a shim, helps to reduce brake squeal by damping vibration. This results from the fact that the two layers have different natural frequencies of vibration, so that each of them tends to damp out vibration in the other.

10 It will be understood that numerous variations can be made to the above described embodiments without departing from the scope of the invention. for example the ratio of the thicknesses of the layers of the laminar member can be varied, or the two layers can be made of different material. Also the laminar member could be made up of  
15 three or more layers all joined together.

CLAIMS

1. A disc brake assembly comprising a disc arranged to rotate with a vehicle wheel, at least one friction pad assembly comprising a friction element and support means for the friction element, and force applying means for urging the friction pad assembly against the disc to cause braking, wherein the support means comprises a laminar member formed from two layers of material of dissimilar thickness.
2. An assembly according to claim 1 wherein the laminar member forms a backplate on which the friction element is mounted.
3. An assembly according to claim 1 wherein the laminar member forms shim.
4. An assembly according to claim 3 wherein the support means further comprises a backplate on which the friction element is mounted.
5. An assembly according to any foregoing claim wherein the layers of the laminar member are joined together by riveting.
6. An assembly according to any one of claims 1 to 4 wherein the layers of the laminar member are joined together by welding.



7. An assembly according to any one of claims 1 to 4 wherein the layers of the laminar member are joined together by adhesive.
8. An assembly according to any one of claims 1 to 4 wherein the layers of the laminar member are joined together by crimping.
9. An assembly according to any one of claims 1 to 4 wherein the layers of the laminar member are joined together by being pressed together.
10. A disc brake assembly substantially as hereinbefore described with reference to figures 1, 3 and 4 or figures 1, 5 and 6 of the accompanying drawings.

**Relevant Technical Fields**

- (i) UK Cl (Ed.M) F2E (EHB, EKA, EEM)  
(ii) Int Cl (Ed.5) F16D 65/00, 02/ 092, 84

Search Examiner  
PETER SQUIRE

Date of completion of Search  
14 SEPTEMBER 1994

**Databases (see below)**

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE DATABASES: WPI

Documents considered relevant following a search in respect of Claims :-  
1 TO 10

**Categories of documents**

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|--|---|
| <p><b>X:</b> Document indicating lack of novelty or of inventive step.</p> <p><b>Y:</b> Document indicating lack of inventive step if combined with one or more other documents of the same category.</p> <p><b>A:</b> Document indicating technological background and/or state of the art.</p> | <p><b>P:</b> Document published on or after the declared priority date but before the filing date of the present application.</p> <p><b>E:</b> Patent document published on or after, but with priority date earlier than, the filing date of the present application.</p> <p><b>&amp;:</b> Member of the same patent family; corresponding document.</p> |
|--|---|

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2202288 A	(FERODO) see Figures 3 and page 7 lines 1 to 9	1, 2, 7
X	GB 2125126 A	(NISSAN) see Figures 2 and 4 and page 4 lines 25 to 28	1 to 5, 7
X	GB 1465304	(FERODO) see whole document	1 to 8
X	GB 1414915	(FERODO) see Figures 2 and 4	1 to 4, 7
X	GB 1392795	(SUMITOMO) see whole document	1, 2, 8
X	WO 91/00966 A1	(RUBORE) see page 1 lines 7 to 13 and figure	1

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).